REMARKS/ARGUMENTS

Brief Summary of Status

Claims 1-3, 5-16, 18-22, 24-28, 30-42, 44-48, 50-54, and 56-61 are pending in the application.

Claims 1-3, 5-16, 18-22, 24-28, 30-42, 44-48, 50-54, and 56-61 are rejected.

Claim Rejections - 35 U.S.C. § 112

1. In the office action, the Examiner states:

"Claims 9, 13-14, 20, and 38-39 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The disclosure doesn't teach the use of a third signal between the first and second signal.

Claim 46 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The disclosure doesn't teach the use of a third signal where the Viterbi decoding of the multiplied third signal is not based on the received third signal." (final office action, Part of Part of Paper No./Mail Date 01302006, p. 6).

Claim Rejections - 35 U.S.C. § 102

2. In the office action, the Examiner states:

"Claims 1-3, 5-8, 10-11, 15-16, 18-19, 21-22, 24-25, 27-28, 30-31, 33-36, 40-42, 44-45, 47-48, 50-51 and 53-54, 56-59 are rejected under 35 U.S.C. 102(a) as being anticipated by Langlais et al. ("Synchronization in the carrier recovery of a satellite link using turbo-codes with the help of tentative decisions", IEE Colloquium on Turbo Codes in Digital Broadcasting - Could It Double Capacity? 22 Nov. 1999 pages: 5/1 – 5/7)." (final office action, Part of Part of Paper No./Mail Date 01302006, p. 7).

3. In the office action, the Examiner states:

"Claims 1-3, 5-8, 10-11, 15-16, 18-19, 21-22, 24-25, 27-28, 30-31, 33-36, 40-42, 44-45, 47-48, 50-51 and 53-54, 56-59 are rejected under 35 U.S.C. 102(a) as being anticipated by Mottier ("Influence of tentative decisions provided by a Turbo-decoder on the carrier synchronization: Application to 64-QAM signals", COST 254 Workshop on Emerging Techniques for Communication Terminals, Toulouse France July 7-9, 1997, pages 326-330).

NOTE : This paper is reference 5 of Langlais paper." (final office action, Part of Part of Paper No./Mail Date 01302006, p. 15).

Claim Rejections - 35 U.S.C. § 103

4. In the office action, the Examiner states:

"Claims 9, 13-14, 20, 38-39 and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Langlais et al. as applied to claims 1, 11, 15, 35, and 33 above in view of Divsalar (US 6023783 A), and further in view of Berrou (US 5446747 A)." (final office action, Part of Part of Paper No./Mail Date 01302006, p. 24).

5. In the office action, the Examiner states:

"Claims 12, 20, 26, 32, 37, 52 and 59-61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Langlais et al. as applied to claim 11 above, and further in view of Robertson et al., "Bandwidth-Efficient Turbo Trellis-coded Modulation Using Punctured Component Codes," IEEE Journal on Selected Areas in Communications; 0211998, pp. 206-218,. Vol. 16, No. 2)." (final office action, Part of Part of Paper No./Mail Date 01302006, p. 25).

6. In the office action, the Examiner states:

"Claims 9, 13-14, 20, 38-39 and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mottier et al. as applied to claims 1, 11, 15, 35, and 33 above in view of Divsalar (US 6023783 A), and further in view of Berrou (US 5446747 A). Mottier teach claims 1, 11, 15, 33 and 35. Mottier discloses a turbo encoder comprised with two trellis encoders separated by an interleaver. Mottier doesn't disclose two (or more) trellis

encoders separated by interleavers may be used, and puncturing the parity bits." (final office action, Part of Part of Paper No./Mail Date 01302006, p. 27).

7. In the office action, the Examiner states:

"Claims 12, 20, 26, 32, 37, 52 and 59-61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mottier et al. as applied to claim 11 above, and further in view of Robertson et al., "Bandwidth-Efficient Turbo Trellis-coded Modulation Using Punctured Component Codes," IEEE Journal on Selected Areas in Communications; 0211 998, pp. 206-2 18,. Vol. 16, No. 2)." (final office action, Part of Part of Paper No./Mail Date 01302006, p. 28).

Claim Rejections - 35 U.S.C. § 112

1. In the office action, the Examiner states:

"Claims 9, 13-14, 20, and 38-39 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The disclosure doesn't teach the use of a third signal between the first and second signal.

Claim 46 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The disclosure doesn't teach the use of a third signal where the Viterbi decoding of the multiplied third signal is not based on the received third signal." (final office action, Part of Part of Paper No./Mail Date 01302006, p. 6).

The Applicant respectfully traverses.

In the originally filed specification, the Applicant clearly depicts that an encoded signals (e.g., such as those generated by the turbo-encoder 200 of FIG. 2 and FIG. 3) employ a parallel concatenated structure ("Turbo encoder 200 is a parallel concatenated encoder." Specification, p. 4, line 14).

It is clear that first information (e.g., a first symbol or a first signal) as encoded by the top "trellis encoder 203" of the "turbo-encoder 200" is provided to the communication channel firstly, then second information (e.g., a second symbol or a second signal) as encoded by the bottom "trellis encoder 207" of the "turbo-encoder 200" is provided to the communication channel secondly, then third information (e.g., a third symbol or a third signal) as encoded by the top "trellis encoder 203" of the "turbo-encoder 200" is provided to the communication channel thirdly, then fourth information (e.g., a fourth symbol or a fourth signal) as encoded by the bottom "trellis encoder 207" of the "turbo-encoder 200" is provided to the communication channel fourthly, and so on. The switch 209 alternatively selects between the top and bottom path that correspond to the

The claimed subject matter operates by using the information encoded by the top "trellis encoder 203" of the "turbo-encoder 200" and the bottom "trellis encoder 207" of the "turbo-encoder 200".

"In other words, switch 209 selects between the output of trellis encoder 203 and trellis encoder 207." (Specification, p. 4, lines 4-5)

Moreover, the originally filed specification also explicitly discloses the following:

"The interleaver 205 accepts the data 201 and interleaves or shuffles the data before providing it to the trellis encoder 207. As a result, the data provided by the lower leg of the turbo encoder comprising the trellis encoder 207 is out of sequence and must be resequenced. For this reason, switch 303 is added to the Viterbi decoder 301 so that only the symbols from trellis encoder 203 or trellis encoder 207 are used by the phase detector 217 to adjust the controlled oscillator 223. The delay introduced by interleaver 205 makes it impractical for the Viterbi decoder 301 to use symbols from both sides of the turbo encoder 200 without a buffering and delay mechanism at the input of the Viterbi decoder. Switch 303 will select every other symbol. Either a symbol from trellis encoder 203 will be selected or a symbol from trellis encoder 207 will be selected by switch 303." (Specification, p. 4, line 34 to p. 5, line 8)

Therefore, in at least one embodiment such as illustrated with respect to FIG. 3 of the Applicant's originally filed specification, the originally filed specification supports the use of using the Viterbi decoder 301 in using only the information (or symbols, or signals) that have been encoded by one of the "trellis encoder 203" of the "turbo-encoder 200" and the bottom "trellis encoder 207" of the "turbo-encoder 200". As a function of time in at least this one embodiment, the Viterbi decoder 301 would operate by operating using the first information (e.g., a first symbol or a first signal) as encoded by the top "trellis encoder 203" of the "turbo-encoder 200" and the third information (e.g., a third symbol or a third signal) as encoded by the top "trellis encoder 203" of the "turbo-encoder 200", and so on. Because of the use of the switch 303 in such an embodiment, the Viterbi decoder 301 would not operate using the second information (e.g., a second symbol or a second signal) as encoded by the bottom "trellis encoder 207" of the "turbo-encoder 200" and the fourth information (e.g., a fourth symbol or a fourth signal) as encoded by the bottom "trellis encoder 207" of the "turbo-encoder 200", and so on.

The Applicant explicitly discloses with respect to this embodiment that the Viterbi decoder 301 operates by using "[e]ither a symbol from trellis encoder 203 will be selected or a symbol from trellis encoder 207 will be selected by switch 303". (Specification, p. 5, lines 7-8)

Therefore, even though first, second, third, fourth, and so on information (or symbols, or signals) are provided to the "turbo-encoder 200" on the transmitter side, and even though such first, second, third, fourth, and so on information (or symbols, or signals) would undergo encoding using either the top "trellis encoder 203" of the "turbo-encoder 200" or the bottom "trellis encoder 207" of the "turbo-encoder 200", the Viterbi decoder 301 on the receiver side of the communication channel 211 would not use all of the first, second, third, fourth, and so on information (or symbols, or signals). Rather, it would use only the first, third, and so on information (or symbols, or signals).

When looking as a function of time, the transmission of the first, second, third, fourth, and so on information (or symbols, or signals) could be referred to as first, second, third, fourth, and so on information (or symbols, or signals).

However, in some of the claims, the Applicant refers to the "first", "third", and so on information (or symbols, or signals) as the "first", "third", and so on information (or symbols, or signals) in order to comply with proper antecedent basis for proper claim format. As such, when the claims refer to the "third signal", this can be interpreted as being the "second" signal as a function of time with respect to transmission across a communication channel (i.e., the first, second, third, fourth, and so on information (or symbols, or signals) that is transmitted across the communication channel). However, given that the Viterbi decoding employs on the first, third, and so on information (or symbols, or signals) that is transmitted across the communication channel in at least one embodiment, the

As such, the Applicant respectfully asserts that the claims contain subject matter which is fact described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The Applicant respectfully asserts that the disclosure does in fact teach the use of a third signal between the first and second signal.

The Applicant respectfully points out to the Examiner that when considering the transmission of:

(1) first information (e.g., a first symbol or a first signal) as encoded by the top "trellis encoder 203" of the "turbo-encoder 200" is provided to the communication channel firstly;

(2) second information (e.g., a second symbol or a second signal) as encoded by the bottom "trellis encoder 207" of the "turbo-encoder 200" is provided to the communication channel secondly;

(3) third information (e.g., a third symbol or a third signal) as encoded by the top "trellis encoder 203" of the "turbo-encoder 200" is provided to the communication channel thirdly;

(4) fourth information (e.g., a fourth symbol or a fourth signal) as encoded by the bottom "trellis encoder 207" of the "turbo-encoder 200" is provided to the communication channel fourthly, and so on;

And when considering that the Viterbi decoding, in at least one embodiment (e.g., when using the switch 303 in the FIG. 3), employs only the (1) first information (e.g., a first symbol or a first signal) as encoded by the top "trellis encoder 203" of the "turbo-encoder 200" and the (3) third information (e.g., a third symbol or a third signal) as encoded by the top "trellis encoder 203" of the "turbo-encoder 200", then in order to comply with proper antecedent basis for proper claim format, these (1) and (3) signals can be referred to as "first" and "second" signals, as they are called out "first" and "second" within the claimed subject matter.

Thereafter, when describing the (2) second information (e.g., a second symbol or a second signal) as encoded by the bottom "trellis encoder 207" of the "turbo-encoder 200", which is not employed within the Viterbi decoding (e.g., as described within claim 9, 13-14, 20, 38-39), then this "(2) second information (e.g., a second symbol or a second signal)" is properly referred to as being a "third signal" or "third symbol" or third information within the claimed subject matter.

Again, the Applicant respectfully points out that the fact that this signal, or symbol is referred to as "third" in the claims, when it can be viewed as being the second

as a function of time as received by a receiving device, is to comport with proper antecedent basis for proper claim format.

From this perspective, then clearly according to such an embodiment, this "third signal", which can be viewed as the second signal as a function of time, which is provided by the encoded by the bottom "trellis encoder 207" of the "turbo-encoder 200", is not employed within the Viterbi decoding. As such, the Applicant respectfully believes that this subject matter as claimed by the Applicant is properly enabled and respectfully requests reconsideration by the Examiner.

The Applicant respectfully asserts that the order in which signals are called out in the claimed subject matter (i.e., "first signal", "second signal", "third signal", "fourth signal" ad so on) corresponds to the order in which they are referred to in order to comply with proper antecedent basis for proper claim format. The Applicant respectfully points out that the order in which signals are called out in the claimed subject matter (i.e., "first signal", "second signal", "third signal", "fourth signal" ad so on) does not necessarily correspond to the order as a function of time of these signals within an apparatus or method. For example, if the "fourth signal as a function of time" were referred to firstly in the claimed subject matter, then it could be referred to as a "first signal". Similarly, if the "second signal as a function of time" is referred to thirdly in the claimed subject matter, then it could be referred to as a "third signal".

Specifically, if a "first signal as a function of time" is referred to firstly in a claim as a first signal, and a "third signal as a function of time" is referred to secondly in the claim as a second signal, then if a "second signal as a function of time" is referred to after the first signal and the second signal in the claim, then it would be appropriate to refer to it as a third signal in the claim.

The same comments are also applicable with respect to claim 46.

As such, the Applicant respectfully requests that the Examiner withdraw the rejection to claims 9, 13-14, 20, and 38-39 under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement.

Also, the Applicant respectfully requests that the Examiner withdraw the rejection to claim 46 under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement.

Claim Rejections - 35 U.S.C. § 102

2. In the office action, the Examiner states:

"Claims 1-3, 5-8, 10-11, 15-16, 18-19, 21-22, 24-25, 27-28, 30-31, 33-36, 40-42, 44-45, 47-48, 50-51 and 53-54, 56-59 are rejected under 35 U.S.C. 102(a) as being anticipated by Langlais et al. ("Synchronization in the carrier recovery of a satellite link using turbo-codes with the help of tentative decisions", IEE Colloquium on Turbo Codes in Digital Broadcasting - Could It Double Capacity? 22 Nov. 1999 pages: 5/1 – 5/7)." (hereinafter referred to as "Langlais") (final office action, Part of Part of Paper No./Mail Date 01302006, p. 7).

The Applicant respectfully traverses.

The Applicant respectfully submits that if a reference, as considered individually as required under 35 U.S.C. §102, fails to disclose each and every element of the subject matter as claimed by the Applicant, then the rejection under 35 U.S.C. §102 should be withdrawn.

In the above referenced office action, the Examiner asserts:

"As per claim 1 Langlais et al. teach a method of processing signals, comprising receiving first and second signals each being modulated on a carrier signal, the first signal preceding the second signal in time (figure 2 page 511 section II.A); multiplying each of the first and second signals with a reference signal having a reference frequency (figure 2 multiplier after y(k) page 511 section II.A); Viterbi decoding the multiplied first signal based on the multiplied first and multiplied second signals (figure 2 phase detector page 511 section II.A, the Viterbi decoding is done in DECI and feed to the mapper); comparing the Viterbi decoded first signal to the multiplied first signal (figure 2 phase detector page 511 section II.A); adjusting the reference frequency as a function of the comparison (figure 2 output of loop filter page 511 section 1I.A); and turbo decoding a signal with adjusted frequency (figure 2 modulo of turbo-decoder pages 511-512 section II.A)." (final office action, Part of Part of Paper No./Mail Date 01302006, p. 7-8).

Langlais teaches and discloses:

"Figure 1 shows the classical diagram of a phase recovery system, whose working is described in section III., followed by the turbo decoder. The decoding process is based

on the serial concatenation of decoder DECl and DEC2, both using Soft Output Viterbi Algorithm." (Langlais, p. 5/1, near bottom of page, emphasis added).

Langlais also teaches and discloses:

"Instead of using hard decisions as symbol reference, some decisions called tentative decisions (TD) are extracted from the first decoder [DEC1] and used in the phase recovery system for the calculation of the phase error. A tentative decision is extracted from the turbo decoder during the decoding process, and not after the complete decoding." (Langlais, p. 5/1, near bottom of page, emphasis added).

Langlais employs 2 separate SOVA (Soft Output Viterbi Algorithm) decoders within the "module of turbo-decoder" of FIG. 2, such that the first SOVA decoder (DEC1) is followed by a de-interleaver (π^{-1}), which is then followed by the second SOVA decoder (DEC2), which is then followed by an interleaver (π). Clearly, all four of the distinct elements of the first SOVA decoder (DEC1), the de-interleaver (π^{-1}), the second SOVA decoder (DEC2), and the de-interleaver (π^{-1}) form the "Module of turbo-decoder" of FIG. 2 of Langlais. The first SOVA decoder (DEC1) does not stand alone, but it is rather an integral part of the "module of turbo-decoder" of FIG. 2 of Langlais.

A partially turbo decoded signal (i.e., these "tentative decisions (TD)") is provided from the first SOVA decoder (DEC1) of the "module of turbo-decoder" of FIG. 2 for use in the "phase recovery system" of FIG. 2 of Langlais. In addition, at least three additional functional blocks are necessary according to the teaching and disclosure of Langlais to employ this partial turbo decoded signal (i.e., the "tentative decision [that] is extracted from the turbo decoder during the decoding process") for use in the "phase recovery system" of FIG. 2 of Langlais.

These three additional functional blocks are the "Soft Demapper", the "Delay $d \cdot T_s$", and the "Mapper" (which apparently does the inverse of the "Soft Demapper" after the signal has undergone the SOVA decoding within the DEC1 portion of the "Module of turbo-decoder").

The Applicant also respectfully points out that because of these at least three additional functional blocks required in Langlais, the input to the DEC1 portion of the "Module of turbo-decoder" is not coupled to the multiplier in FIG. 2 of Langlais. In contradistinction, the input to the DEC1 portion of the "Module of turbo-decoder" is

coupled to the "Soft Demapper" in FIG. 2 of Langlais, which is previously coupled to the multiplier.

In addition, the Applicant also respectfully points out that because of these at least three additional functional blocks required in Langlais, one of the inputs to the "Phase detector" is not coupled to the multiplier in FIG. 2 of Langlais. In contradistinction, one of the inputs to the "Phase detector" is coupled to the "Delay $d \cdot T_s$ "in FIG. 2 of Langlais, which is previously coupled to the multiplier.

The Applicant respectfully points out that all three of these additional functional blocks are required in Langlais to use the "tentative decision [that] is extracted from the turbo decoder during the decoding process" for use in the "phase recovery system" of FIG. 2. The very fact that the turbo decoder of Langlais is accessed "during the decoding process" requires these additional elements. This is extra complexity and connectivity within Langlais that is not required according to the subject matter as claimed by the Applicant.

The Applicant respectfully points out that the "phase recovery system" of FIG. 2 of Langlais is inherently coupled to and requires access to the turbo decoding process therein. For example, Langlais explicitly teaches and discloses that the "tentative decision is extracted from the turbo decoder during the decoding process". As can be seen by FIG. 2 of Langlais, the "tentative decision" is provided from the first SOVA decoder (DEC1), which is actually part of the "Module of turbo-decoder" of FIG. 2 of Langlais. In other words, the turbo decoding processing must begin before the "tentative decision" of Langlais can even be generated.

Within Langlais, the turbo decoding processing must begin before the "phase recovery system" of FIG. 2 can begin to perform any measurement at all by the "Phase detector" implemented therein. In other words, the "Phase detector" of FIG. 2, which is part of the "phase recovery system" does not provide any information until after the turbo decoding processing has begun. Therefore, there is no adjustment of the signal output from the "Integrator" of Langlais, which then adjusts the multiplier block of FIG. 2, until after the turbo decoding processing has begun. Thereafter, the "tentative decision is extracted from the turbo decoder during the decoding process."

Therefore, the Applicant respectfully points out that the signal output from the first SOVA decoder (DEC1) of FIG. 2 of Langlais does not then undergo turbo decoding processing, but in contradistinction, the signal output from the first SOVA decoder (DEC1) of FIG. 2 of Langlais is an intermediate signal that is generated during the turbo decoding processing. Therefore, although the signal output from the first SOVA decoder (DEC1) of FIG. 2 of Langlais is a SOVA decoded signal, it would be improper to characterize that this signal then undergoes turbo decoding processing because this signal is inherently part of the turbo decoding processing (i.e., it is already undergoing the turbo decoding processing).

The Applicant respectfully points out that is it well known in the art of turbo decoding that 2 separate soft decoders (e.g., sometimes referred to as "soft-in soft-out" decoders" in the art) are typically employed within turbo decoding processing. In the art, these 2 separate soft decoders sometimes employ the Maximum A Posteriori (MAP) Decoding Algorithm or the Soft Output Viterbi Algorithm (SOVA).

The embodiments of the "Module of turbo-decoder" of FIG. 1 and FIG. 2 of Langlais follow this prior art approach of turbo decoding, in which two separate soft decoders (which employ the SOVA approach) have a de-interleaver (π^{-1}) interposed between them, and an interleaver (π) follows the second of the two soft decoders, from which the decoded output is provided. In some prior art approaches, the output from the interleaver (π) is fed back to the first soft decoder to perform multiple decoding iterations. Langlais refers to this iterative decoding processing approach, in that, Langlais discloses:

"A tentative decision is extracted from the turbo decoder during the decoding process, and not after the complete decoding. Although the reliability of the decision improves along with the iterative process, we cannot use a decision with an excessive delay in order to guarantee the stability of the phase-locked loop (PLL); thus since the delay introduced by the interleaver is too long, the extraction of the TD is performed before the first interleaver." (Langlais, p. 5/1, near bottom of page, emphasis added).

The Applicant respectfully points out that the first SOVA decoder (DEC1) and the second SOVA decoder (DEC2) are both part of the turbo decoder of Langlais (i.e., part of the "Module of turbo-decoder" of FIG. 2 of Langlais).

The Applicant respectfully points out that the first SOVA decoder (DEC1) of Langlais, from which the "tentative decision" is provided for use in the "phase recovery system" of FIG. 2 of Langlais is not a Viterbi decoder that is separate and distinct from the "Module of turbo-decoder" of FIG. 2 of Langlais.

In contradistinction, the first SOVA decoder (DEC1) is an integral part of the "Module of turbo-decoder" of FIG. 2 of Langlais. As such, the Applicant respectfully points out that the "tentative decision", provided by the first SOVA decoder (DEC1) of Langlais, is actually a partially, turbo decoded signal. As such, the output from the first SOVA decoder (DEC1) of Langlais, being a partially, turbo decoded signal continues to undergo turbo decoding within the "Module of turbo-decoder" of FIG. 2 of Langlais to complete the turbo decoding of the signal output from the "Soft Demapper" of FIG. 2 of Langlais.

According to Langlais, it is the signal that is output from the "Soft Demapper" of FIG. 2 of Langlais that actually undergoes turbo decoding. There is no teaching and disclosure in Langlais that the signal that is output from the "Soft Demapper" is a SOVA decoded signal.

From one perspective, the signal output from the first SOVA decoder (DEC1) of FIG. 2 of Langlais is therefore a partially, turbo decoded signal. Alternatively, the signal output from the first SOVA decoder (DEC1) of FIG. 2 of Langlais can be viewed as being merely a SOVA decoded signal. However, from either perspective, the signal output from the first SOVA decoder (DEC1) of FIG. 2 of Langlais does not then undergo turbo decoding, in that, this signal is actually an intermediate signal generated during the turbo decoding processing. All four of the components (i.e., the first SOVA decoder (DEC1), the de-interleaver (π^{-1}), the second SOVA decoder (DEC2), and the de-interleaver (π^{-1})) form the "Module of turbo-decoder" of FIG. 2 of Langlais. Therefore, the output from the first SOVA decoder (DEC1) does not undergo turbo decoding, but rather the signal output from the "Soft Demapper" of FIG. 2 of Langlais is the signal that undergoes turbo decoding.

The Applicant respectfully points out this clarification that the SOVA decoding of Langlais is actually part of the turbo decoding of Langlais. There is no disclosure of any SOVA decoding of Langlais that is separate and distinct to the turbo decoding of

Langlais. Stated another way, according to the teaching and disclosure of Langlais, there is no SOVA decoded signal that subsequently undergoes turbo decoding.

According to the subject matter as claimed by the Applicant, the Applicant respectfully points out that the turbo decoding is performed on a Viterbi decoded signal.

The Applicant respectfully points out that Langlais fails to teach and disclose that turbo decoding is performed on a Viterbi decoded signal. To do so, Langlais would require 3 separate SOVA decoders (a first SOVA decoder to generate the Viterbi decoded signal and second and third SOVA decoders to perform the turbo decoding on the Viterbi decoded signal, which is generated by the first SOVA decoder).

Again, Langlais teaches and discloses that the partially turbo decoded signal (as generated by first SOVA decoder (DEC1)) is employed to provide the "tentative decision" for use in the "phase recovery system" of FIG. 2. The signal output from the first SOVA decoder (DEC1) does not then undergo turbo decoding; in contradistinction, the turbo decoding, which is already partially performed is merely completed. Langlais fails to teach and disclose Viterbi decoding of a signal to generate a Viterbi decoded signal and then subsequent turbo decoding of that Viterbi decoded signal. Langlais teaches and discloses the required access to the "Module of turbo-decoder" in order to get the "tentative decision" for use in the "phase recovery system" of FIG. 2.

In the Applicant's originally filed specification, the Applicant explicitly states:

"In order to improve the accuracy, the slicer 215 may be replaced by a Viterbi decoder as illustrated in Figure 3." (Specification, p. 4, lines 20-21)

As can be seen in the Applicant's originally filed specification, the slicer 215 is followed by a turbo decoder 219 in FIG. 2. Therefore, if the slicer 215 is replaced by a Viterbi decoder 301 to assist in generating the embodiments as depicted in FIG. 3 and FIG. 4, then the Viterbi decoder 301 is followed by the turbo decoder 219 in FIG. 3 and FIG. 4.

Therefore, according to the Applicant's originally filed specification in FIG. 3 and FIG. 4, the signals which undergo Viterbi decoding using the Viterbi decoder 301 are employed to assist in the input to the phase detector 217 and subsequent control of the VCO 223. Thereafter, the Viterbi decoded signal is provided to the turbo decoder 219 in FIG. 3 and FIG. 4 to undergo turbo decoding.

The embodiments of the FIG. 3 and the FIG. 4 of the Applicant's originally filed specification do not require access to the turbo decoder 219. In contradistinction, Langlais requires access to the access to the "Module of turbo-decoder" in order to get the "tentative decision" for use in the "phase recovery system" of FIG. 2. Moreover, because of this required access to the "Module of turbo-decoder" in order to get the "tentative decision" for use in the "phase recovery system" of FIG. 2 of Langlais, the additional components are also required such as the "Soft Demapper", the "Delay $d \cdot T_s$ ", and the "Mapper" (which apparently does the inverse of the "Soft Demapper" after the signal has undergone the SOVA decoding within the DEC1 portion of the "Module of turbo-decoder") as explicitly shown within FIG. 2 of Langlais.

As such, the Applicant respectfully asserts that Langlais does not teach and disclose a SOVA decoded signal that subsequently undergoes turbo decoding.

Rather, Langlais teaches and discloses a signal that only undergoes turbo decoding (a portion of the turbo decoding is referred to as SOVA decoding), but Langlais does not both SOVA decoding and turbo decoding. Again, to do so, Langlais would require 3 SOVA decoders: a first SOVA decoder to generate the Viterbi decoded signal and second and third SOVA decoders to perform the turbo decoding on the Viterbi decoded signal, which is generated by the first SOVA decoder. The Applicant respectfully asserts that Langlais could be interpreted to perform (1) "first SOVA decoding and second SOVA decoding" or (2) "turbo decoding". Langlais does not teach and disclose both SOVA decoding and turbo decoding. The first SOVA decoding of Langlais is in fact a part of the turbo decoding thereof. Again, all four of the components (i.e., the first SOVA decoder (DEC1), the de-interleaver (π^{-1}), the second SOVA decoder (DEC2), and the interleaver (π)) form the "Module of turbo-decoder" of FIG. 2 of Langlais.

Also, because of these characteristics of Langlais, the Applicant respectfully asserts that Langlais fails to teach and disclose any Viterbi decoder that is coupled to a turbo decoder. Again, the first SOVA decoder (DEC1) of the "Module of turbo-decoder" in FIG. 2 of Langlais is part of the "Module of turbo-decoder" therein. There is no teaching and disclosure of a Viterbi decoder that is separate and distinct from a turbo decoder within Langlais.

Therefore, in light of at least these comments made above, the Applicant respectfully believes that Langlais fails to teach and disclose each and every limitation of the subject matter as claimed by the Applicant in independent claims 1, 15, 21, 27, 33, 47, and 53.

As such, the Applicant respectfully requests that the Examiner withdraw the rejection of claims 1-3, 5-8, 10-11, 15-16, 18-19, 21-22, 24-25, 27-28, 30-31, 33-36, 40-42, 44-45, 47-48, 50-51 and 53-54, 56-59 under 35 U.S.C. § 102(a) as being anticipated by Langlais.

The Applicant respectfully believes that claims 2-3, 5-8, 10-11, being further limitations of the subject matter as claimed in claim 1, are also allowable.

The Applicant respectfully believes that claims 16, 18-19, being further limitations of the subject matter as claimed in claim 15, are also allowable.

The Applicant respectfully believes that claims 22, 24-25, being further limitations of the subject matter as claimed in claim 21, are also allowable.

The Applicant respectfully believes that claims 28, 30-31, being further limitations of the subject matter as claimed in claim 27, are also allowable.

The Applicant respectfully believes that claims 34-36, 40-42, 44-45, being further limitations of the subject matter as claimed in claim 33, are also allowable.

The Applicant respectfully believes that claims 48, 50-51, being further limitations of the subject matter as claimed in claim 47, are also allowable.

The Applicant respectfully believes that claims 54, 56-59, being further limitations of the subject matter as claimed in claim 53, are also allowable.

3. In the office action, the Examiner states:

"Claims 1-3, 5-8, 10-11, 15-16, 18-19, 21-22, 24-25, 27-28, 30-31, 33-36, 40-42, 44-45, 47-48, 50-51 and 53-54, 56-59 are rejected under 35 U.S.C. 102(a) as being anticipated by Mottier ("Influence of tentative decisions provided by a Turbo-decoder on the carrier synchronization: Application to 64-QAM signals", COST 254 Workshop on Emerging Techniques for Communication Terminals, Toulouse France July 7-9, 1997, pages 326-330).

NOTE : This paper is reference 5 of Langlais paper." (final office action, Part of Part of Paper No./Mail Date 01302006, p. 15).

The Applicant respectfully traverses.

The Applicant again respectfully submits that if a reference, as considered individually as required under 35 U.S.C. §102, fails to disclose each and every element of the subject matter as claimed by the Applicant, then the rejection under 35 U.S.C. §102 should be withdrawn.

In the above referenced office action, the Examiner asserts:

"As per claim 1 Mottier et al. teach a method of processing signals, comprising receiving first and second signals each being modulated on a carrier signal, the first signal preceding the second signal in time (figure 3 sections 2 and 3, pages 327-328); multiplying each of the first and second signals with a reference signal having a reference frequency (figure 3 sections 2 and 3, pages 327-328 multiplier after y(k)); Viterbi decoding the multiplied first signal based on the multiplied first and multiplied second signals (figure 3 sections 2 and 3, pages 327-328, the Viterbi decoding is done in DEC1 and feed to the mapper); comparing the Viterbi decoded first signal to the multiplied first signal (figure 3 sections 2 and 3, pages 327-328); adjusting the reference frequency as a function of the comparison (f figure 3 sections 2 and 3, pages 327-328 output of loop filter); and turbo decoding a signal with adjusted frequency (figure 3 sections 2 and 3, pages 327-328 modulo of turbo-decoder)." (final office action, Part of Part of Paper No./Mail Date 01302006, p. 16).

The Applicant respectfully points out that these Examiner cited portions of Mottier are almost exactly duplicated in Langlais. FIG. 3 of Mottier is almost identical to FIG. 2 of Langlais with the exception being the "Soft Demapper" and the "Mapper" employed within the FIG. 2 of Langlais.

As described in detail above with respect to Langlais, the Applicant respectfully asserts that Mottier also fails to teach and disclose a SOVA decoded signal that subsequently undergoes turbo decoding. Similar to Langlais, Mottier requires access to the access to the "Module of turbo-decoder" in order to get the "tentative decision" for use in the "phase recovery system" of FIG. 3 of Mottier (analogous to FIG. 2 of Langlais).

Similar to Langlais, Mottier teaches and discloses a signal that only undergoes turbo decoding (a portion of the turbo decoding is referred to as SOVA1 decoding), but Mottier does not both SOVA decoding and turbo decoding. Again, to do so, Mottier would require 3 SOVA decoders: a first SOVA decoder to generate the Viterbi decoded signal and second and third SOVA decoders to perform the turbo decoding on the Viterbi decoded signal, which is generated by the first SOVA1 decoder. The Applicant respectfully asserts that Mottier could be interpreted to perform (1) "first SOVA decoding and second SOVA decoding" or (2) "turbo decoding". Langlais does not teach and disclose both SOVA decoding and turbo decoding. The first SOVA decoding of Langlais is in fact a part of the turbo decoding thereof. Again, all four of the components (i.e., the first SOVA decoder (DEC1 which performs the "SOVA1 decoding process"), the interleaver (π), the second SOVA decoder (DEC2), and the de-interleaver (π^{-1})) form the "Module of turbo-decoder" of FIG. 3 of Mottier.

Also, because of these characteristics of Mottier, the Applicant respectfully asserts that Mottier fails to teach and disclose any Viterbi decoder that is coupled to a turbo decoder. Again, the first SOVA decoder (DEC1 which performs the "SOVA1 decoding process") of the "Module of turbo-decoder" in FIG. 3 of Mottier is part of the "Module of turbo-decoder" therein. There is no teaching and disclosure of a Viterbi decoder that is separate and distinct from a turbo decoder within Mottier.

Therefore, in light of at least these comments made above, the Applicant respectfully believes that Mottier fails to teach and disclose each and every limitation of the subject matter as claimed by the Applicant in independent claims 1, 15, 21, 27, 33, 47, and 53.

As such, the Applicant respectfully requests that the Examiner withdraw the rejection of claims 1-3, 5-8, 10-11, 15-16, 18-19, 21-22, 24-25, 27-28, 30-31, 33-36, 40-42, 44-45, 47-48, 50-51 and 53-54, 56-59 under 35 U.S.C. § 102(a) as being anticipated by Mottier.

The Applicant respectfully believes that claims 2-3, 5-8, 10-11, being further limitations of the subject matter as claimed in claim 1, are also allowable.

The Applicant respectfully believes that claims 16, 18-19, being further limitations of the subject matter as claimed in claim 15, are also allowable.

The Applicant respectfully believes that claims 22, 24-25, being further limitations of the subject matter as claimed in claim 21, are also allowable.

The Applicant respectfully believes that claims 28, 30-31, being further limitations of the subject matter as claimed in claim 27, are also allowable.

The Applicant respectfully believes that claims 34-36, 40-42, 44-45, being further limitations of the subject matter as claimed in claim 33, are also allowable.

The Applicant respectfully believes that claims 48, 50-51, being further limitations of the subject matter as claimed in claim 47, are also allowable.

The Applicant respectfully believes that claims 54, 56-59, being further limitations of the subject matter as claimed in claim 53, are also allowable.

Claim Rejections - 35 U.S.C. § 103

4. In the office action, the Examiner states:

"Claims 9, 13-14, 20, 38-39 and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Langlais et al. as applied to claims 1, 11, 15, 35, and 33 above in view of Divsalar (US 6023783 A), and further in view of Berrou (US 5446747 A)." (hereinafter referred to as "Berrou") (final office action, Part of Part of Paper No./Mail Date 01302006, p. 24).

The Applicant respectfully believes that the inclusion of Berrou fails to overcome the deficiencies of Langlais with respect to independent claims 1, 15, and 33.

The Applicant respectfully believes that claims 9, 13-14, 20, 38-39 and 46, being further limitations of the subject matter as claimed in independent claims 1, 15, and 33, respectively, are also allowable.

As such, the Applicant respectfully requests that the Examiner withdraw the rejection of claims 9, 13-14, 20, 38-39 and 46 under 35 U.S.C. § 103(a) as being unpatentable over Langlais et al. as applied to claims 1, 11, 15, 35, and 33 above in view of Divsalar and further in view of Berrou.

5. In the office action, the Examiner states:

"Claims 12, 20, 26, 32, 37, 52 and 59-61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Langlais et al. as applied to claim 11 above, and further in view

of Robertson et al., "Bandwidth-Efficient Turbo Trellis-coded Modulation Using Punctured Component Codes," IEEE Journal on Selected Areas in Communications; 0211998, pp. 206-218,. Vol. 16, No. 2)." (hereinafter referred to as "Robertson") (final office action, Part of Part of Paper No./Mail Date 01302006, p. 25).

The Applicant respectfully believes that the inclusion of Robertson fails to overcome the deficiencies of Langlais with respect to independent claims 1, 15, 21, 27, 33, 47, and 53.

The Applicant respectfully believes that claims 12, 20, 26, 32, 37, 52 and 59-61, being further limitations of the subject matter as claimed in independent claims 1, 15, 21, 27, 33, 47, and 53, respectively, are also allowable.

As such, the Applicant respectfully requests that the Examiner withdraw the rejection of claims 12, 20, 26, 32, 37, 52 and 59-61 under 35 U.S.C. § 103(a) as being unpatentable over Langlais et al. as applied to claim 11 above, and further in view of Robertson.

6. In the office action, the Examiner states:

"Claims 9, 13-14, 20, 38-39 and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mottier et al. as applied to claims 1, 11, 15, 35, and 33 above in view of Divsalar (US 6023783 A), and further in view of Berrou (US 5446747 A). Mottier teach claims 1, 11, 15, 33 and 35. Mottier discloses a turbo encoder comprised with two trellis encoders separated by an interleaver. Mottier doesn't disclose two (or more) trellis encoders separated by interleavers may be used, and puncturing the parity bits." (Divsalar (US 6023783 A) hereinafter referred to as "Divsalar") (final office action, Part of Part of Paper No./Mail Date 01302006, p. 27).

The Applicant respectfully believes that the inclusion of Divsalar and Berrou with Mottier fails to overcome the deficiencies of Mottier with respect to independent claims 1, 15, and 33.

The Applicant respectfully believes that claims 9, 13-14, 20, 38-39 and 46, being further limitations of the subject matter as claimed in independent claims 1, 15, and 33, respectively, are also allowable.

As such, the Applicant respectfully requests that the Examiner withdraw the rejection of claims 9, 13-14, 20, 38-39 and 46 under 35 U.S.C. § 103(a) as being unpatentable over Mottier et al. as applied to claims 1, 11, 15, 35, and 33 above in view of Divsalar, and further in view of Berrou.

7. In the office action, the Examiner states:

"Claims 12, 20, 26, 32, 37, 52 and 59-61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mottier et al. as applied to claim 11 above, and further in view of Robertson et al., "Bandwidth-Efficient Turbo Trellis-coded Modulation Using Punctured Component Codes," IEEE Journal on Selected Areas in Communications; 0211 998, pp. 206-2 18,. Vol. 16, No. 2)." (final office action, Part of Part of Paper No./Mail Date 01302006, p. 28).

The Applicant respectfully believes that the inclusion of Robertson fails to overcome the deficiencies of Mottier with respect to independent claims 1, 15, 21, 27, 33, 47, and 53.

The Applicant respectfully believes that claims 12, 20, 26, 32, 37, 52 and 59-61, being further limitations of the subject matter as claimed in independent claims 1, 15, and 33, respectively, are also allowable.

As such, the Applicant respectfully requests that the Examiner withdraw the rejection of claims 12, 20, 26, 32, 37, 52 and 59-61 under 35 U.S.C. § 103(a) as being unpatentable over Mottier et al. as applied to claim 11 above, and further in view of Robertson.

The Applicant respectfully believes that claims 1-3, 5-16, 18-22, 24-28, 30-42, 44-48, 50-54, and 56-61 are in condition for allowance and respectfully requests that they be passed to allowance.

The Examiner is invited to contact the undersigned by telephone or facsimile if the Examiner believes that such a communication would advance the prosecution of the present patent application.

RESPECTFULLY SUBMITTED,

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